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INSTITUTE OF GAS TECHNOLOGY

THE GAS INDUSTRY'S OWN EDUCATIONAL AND RESEARCH FACILITY

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GAS ABSTRACTS

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1. GAS INDUSTRY

Construction Plans

GAS INDUSTRY WILL SPEND $3,977,000,000 IN 1953-56 PERIOD ON NEW CONSTRUCTION. *Gas Age*, **112**, 43, 71, 72 (1953) July 16.

A summary of the AGA estimates on new construction and expansion of present plants for the four years 1953-1956, this article also discusses some of the more significant factors involved.

R. F. Bukacek

Fair Return Base

Tatham, C., Jr. THE FORGOTTEN FACTOR IN FAIR RETURN. *Public Utilities Fortn.*, **50**, 3-11 (1953) July 2.

The author suggests that "fair return" be based not on the book value of invested equity capital, but on the market price of the stock, which is invariably higher than book value. This would encourage investment of new capital.

A. E. S. Neumann

F.P.C. Policy

Finley, J. E. REGULATION OF NATURAL GAS: PRODUCERS THROWN INTO NEW CONFUSION BY PHILLIPS DECISION. *Am. Gas J.*, **179**, 18, 19 (1953) July.

Although the FPC decided two years ago it had no authority to regulate the price of natural gas at the wellhead, the U. S. Court of Appeals for the District of Columbia now rules that FPC has such authority, and must take jurisdiction over independent producers. This decision is expected to bring the issue before the Supreme Court for final ruling after 13 years of dispute.

A. E. S. Neumann

Logan, L. J. FPC POLICIES CURTAIL GAS SUPPLIES. *World Oil*, **137**, 71-74 (1953) July.

A review of the Federal Power Commission's existing policy toward transmission companies is presented and its effect on the supply of natural gas and subsequent price is discussed. The transmission companies are deterred from developing reserves and production, and the producing companies are hesitant about supplying natural gas for fear of federal regulation. As a result of the demand for gas from new areas and the limited offering of natural gas to pipelines, wellhead prices although still comparatively low are rising steadily.

H. A. Dirksen

Gas & Oil Cooperation

Kayser, P. OIL AND GAS STAND SIDE BY SIDE. *World Oil*, **137**, 68, 70, 75 (1953) Aug. 1.

The interdependence of the natural gas and the oil industries is pointed out, especially as regards their responsibilities to one another and the need for cooperation if they are to realize their opportunities in the long run.

R. F. Bukacek

Information Storage

Freel, E. T. MICROFILMING FIELD BROADENS. *Petroleum Refiner*, **32**, 219, 220, 22, 24, 27 (1953) July.

As companies expand their facilities, research and personnel, problems of filing and storage become greater. Improvements in microfilming cameras have been made to meet these increases. A significant recent development is the dual-lens camera which records exactly the images on both sides of a record in one operation. A new method of housing is a card-and-index system which by the insertion of strips of the film in narrow die-cut slots of a card provides folder-type filing for records in frequent or constant use. As many as 60 letter-size documents can be filed on a single 5 x 8 in. card.

C. A. Simms

Knaplund, P., Fullerton, P. and Ford, E. HERE ARE THREE WAYS TO...USE PUNCHED-CARD EQUIPMENT. *Oil Gas J.*, **52**, 70, 71, 73, 75 (1953) July 6.

Automatic punched-card equipment, which has been used extensively by petroleum engineers for calculations of reservoir flow, natural depletion, gas injection, vapor-liquid equilibrium, and similar studies involving lengthy mathematical analyses, are now being applied to data-reduction calculations encountered in the exploration for oil. While this type of computation frequently involves a relatively small number of arithmetic operations for each data point, vast quantities of data may have to be

analyzed. In this work the use of punched-card equipment may produce greater accuracy, economy, and speed. In the reduction of magnetic field data the manual reentry of numbers is eliminated. A graphical procedure is replaced by a numerical one in the analysis of seismic data. In radio-positioning calculations a series of tedious formula evaluations is taken over by machine. The details of these three calculations are presented here, not to suggest analytical methods, but to indicate the application of punched-card equipment to specific problems of general interest. Authors' Abstract

Load Forecasts

Hunt, B. E. LOAD FORECASTING IN 600 TOWNS OF 250 TO 25,000 METERS. *Gas Age*, 112, 31-33 (1953) July 30.

The method of predicting the maximum days sendout for a diversified system, and the factors involved in calculation of load forecasts.

B. E. Eakin

Utility Financing

McDiarmid, F. J. HIGHER FINANCING COSTS FOR UTILITIES. *Public Utilities Fortn.*, 52, 78-81 (1953) July 16.

The trends in interest rates on bonds and preferred stocks which represent 70 per cent of the financial structure of the average utility are discussed in the light of their effect on the present and future needs of the utilities based on unprecedented expansion programs now in progress. J. M. Reid

Utilization in Chemicals

Kiddoo, G. PETROCHEMICALS FROM NATURAL GAS: IS THIS GROWING MARKET A THREAT TO THE DISTRIBUTOR? *Gas* 29, 27-31 (1953) July.

An analysis of the increasing use of natural gas and natural gas derivatives for petrochemical manufacture and of the trends in production of these raw materials by the natural gas industry is given. Although petrochemical manufacture has been expanding rapidly and is expected to continue to do so, it is predicted that by 1975 the demand for this use will represent less than 5% of the total gas production.

J. M. Reid

2. APPLIANCES

Appliance Census

GAS WATER HEATERS, GAS WARM-AIR, GAS BOILERS COUNT-OFF BY STATES. *Gas Heat*, 4, 27 (1953) July.

An estimate of the number of gas-fired warm air and boiler installations and of automatic gas water heaters in operation by states is given. This is based on census figures up to 1953 checked against AGA, GAMA and *Gas Heat's* field reports; these indicate a total of 16,200,000 automatic water heaters, 6,678,300 warm air and 1,580,600 boilers.

O. P. Brysch

Customers Service

Segeler, C. G. GAS INDUSTRY SERVICING POLICIES. *Am. Gas Assoc. Monthly*, 35, 21-23, 50-52 (1953) July-August.

A survey was made of customer's requests, such as burner and control adjustments, lubrication, cleaning of flues, turn on-turn off, parts, replacement, and repairs. Results of the survey are discussed and presented in tables. A statement of good policy is made which involves the responsibility of the customer and responsibilities to the customer. R. Parker

Domestic Heating

Burke, D. T. WASHINGTON AND THE GAS HEAT DEALER. *Gas Heat*, 4, 24, 25, 71, 72 (1953) June.

The article reviews a report and survey made by the Petroleum Administration for Defence, comparing the residential space heating against the increase for house heating. The Kerr Bill is also reviewed. The author attempts to show how the dealer is involved in the Washington scene. J. G. Chalcraft

GAS UTILITIES ADD MORE THAN MILLION HOUSEHEATING CUSTOMERS. *Gas Heat*, 4, 45-46 (1953) July.

During the 1952-53 heating season, the AGA estimates that 1,090,000 new househeating installations were added, bringing the total residential househeating customers to 11,718,000.

Potential house-heating customers are estimated at 19,960,000; these and anticipated additional customers from 1953 to 1956 are tabulated by state. O. P. Brysch

Gas Quality Control

Bowman, L. B. SOME EXPERIENCES WITH NATURAL GAS. *Can Gas J.*, **46**, 188-194 (1953) July.

The Rochester, New York, conversion to natural gas and reformed natural gas is discussed. The reasons for selecting these sendout gases are discussed. E. F. Searight

Sloan, R. A. HOW TO CONTROL SENDOUT QUALITY WITH 11 GASES. *Gas* **29**, 52, 54, 56, 58 (1953) July.

By this winter, 11 gases will be available for sendout at Philadelphia. In order to maintain the quality of sendout, it is found necessary to control the hydrogen-inerts ratio, and the ratio of fast to slow burning gases. These ratios are determined with sufficient accuracy with a flame height burner, and a set of five-star burners. E. F. Searight

Installation Safety

Abell, C. LET'S MAKE EVERY VENTING INSTALLATION SAFE. *Butane-Propane News*, **15**, 65-69 (1953) August.
Some recommended good pratice rules of LPGA pamphlet No. 1 are discussed. The recommendations cover liquefied petroleum gas piping and appliance installations in buildings.
R. Parker

3. COMBUSTION AND INDUSTRIAL FURNACES

Air Pollution

Resen, F. L. REFINERS WARNED. *Oil Gas J.*, 52, 67 (1953) July 20.

Progress is being made through industry efforts to reduce air pollution along the Houston Ship Channel. Judge Robert Casey warns, however, that the public must be informed of such steps else the companies involved with be plagued with complaints, criticism, and perhaps legal action. D. M. Mason

Sheleichovski, G. W. SOME CONSIDERATIONS OF SMOKE POLLUTION OF AIR. *Eng. Digest* (British), **14**, 244-46 (1953) July. (From *Die Technik* (German), 8, 26-30 (1953) January, a condensation of the book "Air Pollution of Cities by Smoke", 226 pp., Moscow, Russia)

Some of the theoretical aspects of smoke composition and distribution as related to wind strength and turbulence are discussed. The author concludes that smoke at a wind velocity of 4 meters/sec. or above does not constitute a health hazard. G. V. Vosseller

FIELD TESTING OF STACK-DUST EMISSION NEEDS SIMPLIFYING. *Power*, **97**, 76, 77 (1953) August.

The problem of enforcement of air-pollution regulations is complicated by lack of a universally acceptable method for determining the amount of dust released by a boiler stack. ASTM committee D-22 is working on the problem but no solution has been found to date. Many plants have made empirical approaches to the problem. W. G. Bair

Atomic Power

ATOMIC ENERGY TODAY. *Power*, **97**, 90-104 (1953) July.

The engineering studies on atomic energy power made by four private industry groups of two firms each are presented. The studies were made with the arrangement of the Atomic Energy Commission to determine the engineering feasibility, examine economic and technical aspects, determine research and development needed and recommend industry's role in designing, building and operating atomic energy reactors. Groups making the study were: Dow Chemical Co. and Detroit Edison Co., Monsanto Chemical Co. and Union Electric Co., Pacific Gas and Electric Co. and Bechtel Corp., Commonwealth Edison Co. and Public Service Co. of Northern Illinois. The teams considered dual-purpose reactors of designs which might be built in the next few years. Each group came up with a different design but all agreed that a dual-purpose reactor was technically feasible, and with the sale of plutonium would be economical. E. J. Pyrcioch

Brick Burning

Hobson, C. G. COMPARATIVE COSTS AND PERFORMANCE OF NATURAL GAS VS. COAL AND OIL IN THE BRICK INDUSTRY. *Ind. Gas*, 32, 12, 22-24 (1953) July.

A description of the heating operations in firing in the kilns. With gas firing the quality of the bricks has been improved and valuable time has been saved. Other advantages of gas include savings of labor and materials, reduction in maintenance, elimination of ash handling, and improved working conditions.

R. Parker

Combustion Reactions

Arthur, J. R. and Townend, D. T. FUNDAMENTAL ASPECTS OF COMBUSTION—SOME REACTIONS OF ATOMIC HYDROGEN IN FLAMES. *J. Inst. Fuel* (British) 26, 44-51, 61 (1953) July.

Topics such as properties of hydrogen atoms, slow combustion of hydrogen and carbon monoxide, energy release in the combustion of solid carbonaceous fuels, and chemiluminescence in flames are discussed. Material concerning the early experimental work on hydrogen atoms is presented, as well as recent theories of flame propagation. R. Parker

Gas Turbines

Cooper, G. C., Jr. WHAT WE LEARNED IN TWO YEARS EXPERIENCE WITH A GAS TURBINE COMPRESSOR. *Gas Age*, 112, 19-24, 61, 64 (1953) July 2; *Gas*, 29, 116, 118, 120 (1953) September.

A simple cycle internal combustion gas turbine, rated at 1850 hp and coupled to a centrifugal compressor, has proven practical for compression of gas for pipeline transmission. The unit has been operated at gas flow rates of 110 MMCF to 233 MMCF/day with no instability and has developed 2000 bhp under test loading. Fuel oil and natural gas operations were conducted, oil operation being many times more expensive. The turbine used about 16,000 Btu of fuel per hour per brake hp.

E. J. Pyrcioch

Rhea, T. R. and Quill, J. S. GAS TURBINES AND CENTRIFUGAL COMPRESSORS AS APPLIED TO NATURAL-GAS PIPE-LINE SERVICE. *Mech. Eng.*, 75, 534-540 (1953) July.

The gas-turbine-driven centrifugal compressors of the El Paso Natural Gas system (see *Gas Abstracts* 9, No. 8, August 1953, p. 143, article by W. H. Miller) are described by two General Electric Company engineers. They summarize the reasons which favor this type of power for main gas pipe line pumping as follows: 1) Low maintenance and operating cost. A total of 5 men per station is visualized for one, two, or three-unit stations. 2) Short station spacing made possible by centrifugal compressors and automatic or semiautomatic nature of gas turbines results in additional capacity of pipe lines. 3) Gas turbines develop 25 per cent extra horsepower in the wintertime at no increase in installed cost. 4) No water required. Machine will run without air washer. 5) Low oil consumption. Estimated 12 gal per month per 5000-hp unit, including compressors. Little, if any, of this oil is passed into the pipe line which is an important advantage from a point of view of clogging the pipe. 6) Flexibility. The adjustable-speed drive permits operation over wide range of flow conditions. 7) Self-sustaining, no outside electric power required for operation of the turbine. 8) No pulsations transmitted to the pipe. 9) Provision for future increased flow can be made by applying oversized compressor cases and then changing wheels and diffusers when the flow increases.

P. R. Trumpler

Prevention of Fire

Chanter, E. E. FIRE PRECAUTIONS IN OIL INSTALLATIONS: A SURVEY OF PREVENTATIVE MEASURES. *Petroleum* 16, 252-257 (1953) September.

This article provides a general guide to fire prevention and fire protection for petroleum refineries, but many of the regulations apply equally well to any place where petroleum products are stored. It is written on the basis of recommended safe practice rather than rigid regulations, because in determining any particular problem, due consideration must be given to particular circumstances and to any pertinent local conditions.

Author's Abstract

4. CARBONIZATION AND GASIFICATION

CO_2 Manufacture

Sommers, H. A. THE MANUFACTURE AND DISTRIBUTION OF CARBON DIOXIDE. *Chem. Eng. Progress*, **49**, 333-339 (1953) July.

A historical summary of the CO_2 industry and an analysis of the factors affecting manufacture and distribution. An outline of present day manufacturing processes and methods is given. It is probable that future plants will be built with more ethanolamine scrubbing units since the basic patents have run out.

G. V. Vosseller

Carbonization

Otto, C. COKE OVEN BUCKSTAY STRUCTURE. U. S. 2,641,575 (1953) June 9.

A buckstay structure comprising vertical upper and lower sections is claimed, to support the more highly expanding upper brickwork of a battery as well as the cooler less expanding lower portion. The two sections may be joined by a hinge-joint, or bear on each other on co-operating sliding plates, with the movement of the upper section restrained by an adjustable spring and nut, and the lower section restrained by cross-beams thrusting resiliently against auxiliary posts. O. P. Brysch

Steinschlaeger, M. LOW-TEMPERATURE CARBONIZATION OF CARBONACEOUS MATERIAL. U. S. 2,642,387 (1953) June 16.

A process for low-temperature carbonization of coal, shale or peat is claimed which comprises several cast-iron superimposed chambers on a rotating central shaft. Crushed material, fed at the top at the center, falls to the floor of the first chamber and is plowed to the periphery by the rotary motion, and is similarly plowed from the periphery to center in the next lower chamber. The chambers are heated by radially-arranged gas burners in closed reentrant flue channels. O. P. Brysch

Coal Blending

Price, J. D. THE BLENDING OF WESTERN COALS FOR PRODUCTION OF METALLURGICAL COKE. *Mining Engg.*, 5, 716-720 (1953) July.

Each coal presents a problem for individual study when blended with other coals or materials. This has been known from previous American practice, in which 77 out of 86 coke plants in 1949 made use of blending to ensure the production of metallurgical quality coke. Western coals, of generally lower rank, usually require blending with special coals or other additives to obtain strong coke. Use of low volatile coking coals, high volatile non-coking coals, coal tar pitch, low temperature char, coke breeze and petroleum coke breeze in blends is discussed, and analyses and charts are presented to show the attainable improvements for Western coals. Variations in blending material and in plant procedures are mentioned as aids in improving the economics of a plant.

O. P. Brysch

Coal Gasification

Bruggeman, E. A. LURGI PRESSURE GASIFICATION PROCESS. *National Gas Bull.* (Australia), **17**, 8-14 (1953) May-June.

A review is given of the development of the Lurgi pressure gasification process in Germany, including new plant construction in progress in South Africa and Australia. Operating data are discussed. C. G. von Fredersdorff

Hemminger, C. E. (assigned to Standard Oil Development Co.) PRODUCTION OF GASES FROM CARBONACEOUS SOLIDS. U. S. 2,644,745 (1953) July 7.

A reactor for the gasification of solid fuels in a fluidized state which claims the complete utilization of the fuel, and a convenient method of ash disposal is described. S. Mori

Jolley, L. J. and Poll, A. EFFECTS OF REACTIVITY AND SOME OTHER VARIABLES ON GASIFICATION OF COKE WITH STEAM. *J. Inst. Fuel* (British), **26**, 33?-44 (1953) July.

Rates of gasification of a number of cokes in steam at 800-950°C and at atmospheric pressure were determined in an electrically heated

fixed-bed reactor. Results showed that the reaction rate was independent of coke particle-size in the range between 14 and 72 mesh, indicating the importance of internal surface in establishing the rate. It was also demonstrated that the rate of gasification increased with extent of carbon consumption and with steam flow rate and was strongly retarded by hydrogen.

C. G. von Fredersdorff

Rummel, R. GASIFICATION OF COMBUSTIBLE MATERIALS. U. S. 2,647,045 (1953) July 28.

A method and apparatus for coal gasification to produce water gas is described. Granular coal with inherent moisture and carbon dioxide is introduced into a bed of molten slag where it is contacted with oxygen or oxygen-enriched air to complete the reaction. E. J. Pyrcioch

Coal Pulverization

NEW DESIGN OF PENNSYLVANIA BRADFORD BREAKER IS SPACE SAVER. *Combustion*, 25, 58, 59 (1953) July.

A coal breaker designed for peripheral feeding at the middle zone of the cylindrical side-wall as opposed to the conventional end-feed is described. The design permits the installation of effective hammer rotors at each end of the breaker, with a hopper arrangement beneath that reduces appreciably the height of the structure required. Center feeding results in increased capacity so that two of the redesigned breakers do the work of three of the conventional type. E. J. Pyrcioch

Coal Structure

Dryden, I. G. C. CHEMICAL SIGNIFICANCE OF THE TRUE DENSITY OF COALS. *Fuel* (British), 32, 82-88 (1953) January.

By applying an (approximate) additive law of atomic volumes to the calculation of the densities of coals, D. W. van Krevelen has obtained values of a 'ring condensation index' in the coal series. In this paper these values are examined and some fresh conclusions are drawn. The index is found to vary linearly with the hydrogen-carbon ratio. Simplification of van Krevelen's original equation leads to an expression for specific volume in terms of hydrogen content plus either (1) carbon content, (2) oxygen content or (3) a logarithmic term in hydrogen content. It is shown that the logarithmic term or its equivalent is relatively unimportant over a certain range, in which case the Franklin relationship can be quantitatively predicted within small limits of divergence, and that the second term nevertheless leads eventually to a minimum in the curve of density against rank. The problem of explaining Franklin's empirical density-hydrogen relation can thus be translated into chemical terms. Author's Abstract

Fuchs, W. WESENTLICHE VARIABLE IN DER SYSTEMATIK AND IN DER ENTSTEHUNG DER KOHLEN. (ESSENTIAL VARIABLES IN THE SYSTEMATICS AND ORIGIN OF COALS). *Brennstoff-Chemie* (German) 34, 161-167 (1953) June 17.

Present systems of practical and theoretical coal classification are reviewed. The essential variables in coal formation, briefly discussed in the light of the author's extensive studies of the younger coals and lignites are considered to include biological degradation, hydrolysis, oxidation and reduction under varying factors of pressure, temperature and time. O. P. Brysch

Huck, G. and Karweil, J. VERSUCH EINER MODELLVORSTELLUNG VOM FEINBAU DER KOHLE. (RESEARCH ON A MODEL REPRESENTATION OF THE FINE STRUCTURE OF COALS.) *Brennstoff-Chemie* 34, 97-102, April 15; 129-135 (1953) May 20.

After a review of recent investigations of coal fine-structure, further detailed treatment is given to evidence linking certain chemical characteristics with physical properties. Activation of carbons, specific volume, modulus of elasticity, resistance to breakage, heat of combustion, and heat of wetting are reviewed with relation to a fundamental molecular coal structure, over a range of chemical composition and degree of coalification. Reference is made to 77 pertinent items. O. P. Brysch

van Krevelen, D. W. PHYSIKALISCHE EIGENSCHAFTEN UND CHEMISCHE STRUKTUR DER STEINKOHLE. (PHYSICAL PROPERTIES AND CHEMICAL

STRUCTURE OF BITUMINOUS COALS. *Brennstoff-Chemie* (German) 34, 167-182 (1953) June 17.

The extensive studies on coal structure at the Staatsmijnen Central Laboratories are discussed in considerable detail. Statistical studies based on atomic and molar volumes and refraction are given, together with details of the densimetric and refractometric methods applied to account for condensed carbon-hydrogen structures up to 96 C-atom or 37 fused rings. These hypothetical structures are then related to experimental studies of optical, textural, mechanical, thermal and chemical properties of the coals. O. P. Brysch

Gas from Anthracite

Newman, L. L. METHODS AND ECONOMICS OF PRODUCING HIGH BTU GAS FROM ANTHRACITE. *Gas Age*, 112, 22, 60, 61 (1953) July 30.

Since the supply of natural gas must eventually decline, the problem of supplying substitute gases will become increasingly acute. Anthracite now consumed at a greatly reduced rate because of the replacement of carburetted water gas by natural gas, may offer considerable advantage over bituminous coal for the production of natural gas substitutes due to its proximity to eastern gas markets. Assuming that substitute high Btu gases will be produced via catalytic enrichment of synthesis gas from oxygen-steam gasification of solid fuels, the author estimates raw material costs using anthracite in various types of gasification equipment, as follows:

Particle Size	Process	$CO+H_2$, ¢/MCF	CH_4, ¢/MCF
No. 2 Buckw.	Producer	13.8	58
No. 2 Buckw.	Lurgi	11.7	49
Pellets	Producer	10.2	43
Pellets	Slag Prdcr.	9.8	41
Pellets	Lurgi	8.5	36
Pulv. Silt	Suspension atm. press.	12.8	53
Pulv. Silt	Suspension high press.	11.0	46
2-3 in. lump	Water gas	25.4	106

The above calculations were based on unit costs of $12.00/ton broken anthracite (2-3 in. lumps), $6.00/ton No. 2 buckwheat, $2.50/ton pellets, $1.75/ton pulverized silt, $0.40/Mlb.-steam and $3.50/ton oxygen. The author concludes with a short discussion on the present status of research work on synthesis gas production and methanation. C. G. von Fredersdorff

Gas Condensation

Holthaus, P. W. FUEL GAS TREATMENT. U. S. 2,641,114 (1953) June 9.

Naphthalene and water removal from fuel gases, already freed of tar and benzol, is accomplished by compressing to above the expected distribution pressure, then cooling and subsequently expanding in an expansion engine to a pressure at which the condensables drop out. Heat exchange and recovery of expansion engine power for use in compression are included. O. P. Brysch

Hydrogen

Mills, G. A. (assigned to Houdry Process Corp.) PRODUCTION OF HYDROGEN-RICH GASES. U. S. 2,647,042 (1953) July 28.

Recovery of a hydrogen-rich gas stream is described wherein coke-covered solids such as spent catalyst from the reactor in the catalytic cracking of petroleum processes is thermally treated to about 1500° F in a non-oxidizing atmosphere instead of being conventionally burned off with air. In this manner, the 5 to 10 weight per cent of hydrogen usually present in such a coke is made available instead of being lost as waste flue gas. J. M. Reid

Robinson, S. P. (assigned to Phillips Petroleum Co.) PRODUCTION OF HYDROGEN FROM HYDROCARBONS. U. S. 2,647,041 (1953) July 28.

An improvement in the process of catalytically cracking hydrocarbons to hydrogen-rich gas in a pebble heater type of reactor is claimed by using pebbles made of monel or similar metals. Higher catalytic activity is obtained than by the use of refractory pebbles. J. M. Reid

Hydrogenation

HYDROGENATION CHEMICALS. *Can. Chem. Processing*, 37, 40 (1953) July.

Increased emphasis has been placed on the production of aromatic chemicals rather than fuel oil from coal. Greater fractions of aromatic compounds can be produced from coal hydrogenation by reducing the severity of operating conditions imposed in the conversion steps. This trend is shown in a 300 ton coal/day hydrogenation unit recently constructed by Carbide and Carbon Chemicals Corp., and which has demonstrated operability with decreased residence times of 4.5 minutes and pressures of 3500 to 6000 psig, employing only the liquid phase hydrogenation step with consequent reduction in the hydrogen feed requirements.

C. G. von Fredersdorff

Plant Waste Liquors

Muns, G. E. and Thompson, C. V. PROBLEMS IN THE DISPOSAL OF PHENOL WASTE IN COKE PLANTS. *Blast Furnace and Steel Plant*, 41, 761-769 (1953) July.

Standards of pollution abatement must be set which will permit reaching the objective with a minimum treatment of wastes and at minimum cost. The distribution of the burden on municipalities, industries and water plants must be determined. The activities of the Ohio River Valley Water Sanitation Commission, especially its Steel Industry Committee are reviewed. Phenol definition and sources, origin in coke operations, methods of dephenolization and analytical procedures are summarized.

O. P. Brysch

Richardson, B. EFFLUENT LIQUORS FROM CARBURETTED WATER GAS PLANTS. *Gas J.* (British) 274 854 861 (1953) June 24.

Studies are presented on effluent liquors, produced by the condensation of undecomposed generator steam of various carburetted water gas plants, to determine their toxicity and composition of the disolved bodies. The oxygen absorption of the liquor depends on whether circulation is used or not but has seldom been found to exceed 30 parts per 100,000. The principal substances capable of absorbing oxygen are found to be thiosulphates, traces of phenolic bodies and oils. The studies indicate that their discharge into rivers or sewers should not present serious problems provided that the effluents are separated from tar. E. J. Pyrcioch

Williams, T. H., Spiers, H. M., Akeroyd, E. I. THE PURIFICATION OF CARBONISATION EFFLUENTS. *Coke and Gas* (British), 15, 245-52 (1953) July.

A description of the development of a pilot plant and process for producing a water-white effluent, suitable for discharge into streams, from coke oven ammonia-still effluents. The process uses ion-exchange resins and activated carbon for concentration of objectional materials for easy disposal. G. V. Vosseller

Producer Gas

Hartill, I. J. PRODUCER GAS AND THE GAS INDUSTRY. *Gas World* (British), 138, 106-111 (1953) July 11; 159-162 (1953) July 18.

I. The effect of operating variables such as air/steam ratio, air preheat and fuel bed depth on the efficiency of producer gas generation is discussed.

II. The author reviews recent developments which may be applicable for the generation of producer gas including the Lurgi pressure reactor, the Thyssen-Galocsy slagging unit, various pulverized coal gasifiers such as the Koppers and Ruhr-gas cyclone, the British ICI combined fluid bed carbonizer-suspension gasifier and the down-jet producer. Low cost generation of electricity may be possible via a producer-gas-fired gas turbine. C. G. von Fredersdorff

Reforming

Keith, P. C. (assigned to Hydrocarbon Research, Inc.) PROCESS AND APPARATUS FOR EXOTHERMIC REACTIONS. U. S 2,642,346 (1953) June 16.

A reactor for the production of synthesis gas from a CH_4, CO_2, steam, O_2 feed is described. The chamber utilizes a granular solid for heat transfer and is arranged with the solids entering the top of the reaction vessel and the feed streams entering the bottom. The solids are preheated by the reaction products leaving the top of the vessel, and the feed streams are preheated by the down-flowing solids after they leave the reaction zone. W. G. Bair

Dirksen, H. A. and Riesz, C. H. EQUILIBRIUM IN THE STEAM REFORMING OF NATURAL GAS. *Ind. Eng. Chem.* **45**, 1562-63 (1953) July.

A method of correlating data in the steam reforming of natural gas is described and a shortcut procedure of calculation of the equilibrium composition is presented for general application of the method. H. A. Dirksen

Stookey, K. W. (assigned to The Gas Machinery Co.) HIGH-TEMPERATURE REACTOR. U. S. 2,645,566 (1953) July 14.

A high-temperature, vertical tube furnace employing externally-fired silicon carbide reaction tubes. This reactor, described in detail in previous publications, is the one used by the Gas Machinery Company as a continuous gasifier for cracking or reforming light hydrocarbons. J. M. Reid

Purification

Terres, E. EUBER DIE NASSE REINIGUNG VON STEINKOHLENGAS (ON THE WET PURIFICATION OF COAL GAS). *Gas- und Wasserfach,* (German), **94**, 260-265, May; 313-17 (1953) June 1.

This is an extensive discussion of various liquid purification processes for removal of H_2S, NH_3 and HCN from coal gas, their chemical reactions, operating principles, and applications for economic recovery of byproducts. The sulfite (Burkheiser), ammonium polythionate and iron thionate (Feld), C.-A.-S. (Hansen), and manganese thionate (Feld) are included. These are summarized as two groups,—those giving concentrated H2S for recovery by Claus process, and those converting the H2S directly to sulfur. Research on the ternary system NH_3-CO_2-H2O, aiming at urea synthesis, is outlined as a new method of ammonia fixation. O. P. Brysch

Whiting, R. THE CASE FOR THE DEEP PURIFIER. *Gas World* (British), **137**, 1784-87 (1953) June 27; *Gas Times* (British), **75**, 551-553, June 26; **76**, 612, 617, 618, July 10 (1953); *Gas J.* (British), **275**, 153-158 (1953) July 15.

The design, operation, and cost of deep box purifiers are discussed. Comparisons are made with other types of oxide purification units. C. E. Hummel

5. NATURAL GAS AND NATURAL GAS CONDENSATES

British LP-Gas

Squire, E. S. THE PRODUCTION OF LIQUEFIED FUEL GASES. *J. Inst. Petroleum,* **39**, 243-247 (1953) May.

Shaw, S. DISTRIBUTION OF LIQUEFIED PETROLEUM GASES. *J. Inst. Petroleum,* **39**, 247-250 (1953) May.

Taylor, T. H. THE UTILIZATION OF LIQUEFIED PETROLEUM GASES. *J. Inst. Petroleum,* **39**, 250-264 (1953) May.

A brief discussion of the production, distribution and consumption of LP-Gas in England is given in these three papers, dealing primarily with domestic use. It is stated that the industry distributes approximately 40,000 tons of LP-Gas per year to 350,000 consumers representing an average use of 250 pounds per customer per annum. J. M. Reid

British Oil and Gas

Lees, G. M. NATURAL GAS IN GREAT BRITAIN. *Gas J.* (British), **275**, 34-35 (1953) July 1.

A review of the past production of oil and gas, and a presentation of a five-year plan for exploration in Great Britain for natural gas in commercial quantities. B. E. Eakin

Carbon Black

Borger, I. W. (assigned to J. M. Huber Corp.) TREATING CHANNEL BLACK. U. S. 2,643,-182 (1953) June 23.

An improved process for calcining channel black carbon so as to obtain better abrasion resistance and vulcanizing action is claimed. D. C. Gami

Cines, M. R. (assigned to Phillips Petroleum Company) TREATMENT OF FURNACE BLACKS. U. S. 2,641,535 (1953) June 9.

A process is described which consists of treating furnace blacks at moderate temperatures with a current of air or other oxygen-containing gas, containing as a catalyst a minute quantity of sulfur dioxide. It is claimed that the treat-

ment increases the scorch time of the carbon blacks, hardens the pellets, lowers the pH, and makes the black more hydrophilic.

D. V. Kniebes

CARBON BLACK FROM WESTERN OIL—MADE IN CANADA. *Can. Chem. Processing*, 37, 32-33 (1953) July.

A newly constructed oil furnace combustion plant produces carbon black by the partial oxidation of preheated atomized oil with air. Hot gases leaving the furnace at 2700° F are water-quenched to approximately 1000° F and further cooled in an atmospheric heat exchanger and spray cooler to 500° F. A series of cyclones partially separates the carbon black from the cooled gas stream, followed by cloth filters for complete removal. Pelletizing of the collected carbon is the last step of the process.

C. G. von Fredersdorff

NEW PROCESS PUTS SPOTLIGHT ON CARBON BLACK. *Chem. Eng.*, 60, 120, 22, 23 (1953) July.

A process for making carbon black from flare gas from oil wells is claimed. The essentials of the process are a spherical preheater where gas is preheated to the desired temperature, a slotted hood allowing regulated entry of air, and an enclosing metal drum where carbon black forms. A blower pulls the carbon black out of the combustion zone as soon as formed, and blows it into a cyclone and an accumulator.

D. C. Gami

Distribution Systems

Higgins, A. L. HOW BOSTON HANDLES ADDITIONS AND REPLACEMENTS ON SYSTEM. *Gas Age*, 112, 26-27 (1953) July 30.

A description of the factors involved in sizing new mains to be installed and the setup used for obtaining the necessary information.

B. E. Eakin

Gasoline Economics

Vaughan, H. E. GASOLINE AND CYCLING PLANT ECONOMICS VS INCREASING COST OF GAS. *Petroleum Eng. Ref. Annual*, (1953) 25, E-10, 14-16 (1953) July 15.

The value of natural gas in the field has increased fantastically in the last few years and will continue to increase until it has reached a competitive level with other fuels. As the value of gas increases, the fuel and shrinkage losses become more and more of a major economic factor. Since this increase in operating cost, along with other things, is reducing the gasoline and cycling plants' margin of profit, it is up to the plant designers, the equipment manufacturers, and the industry as a whole to reduce operating cost per gallon, reduce investment cost per gallon, and to help create more favorable markets which will permit a fair return on investment. Author's Abstract

Leak Detection

Harper, V. W. HOW GAS CO. IMPROVES LEAKAGE DETECTION IN PUBLIC SAFETY PROGRAM. *Am. Gas J.*, 179, 16, 33 (1953) July.

The intensified program of leakage detection consists of a manhole and hard surface survey semiannually, together with building and vegetation surveys. C. E. Hummel

Line Cleaning

Robinson, E. T., Jr. ECONOMICS OF INTERNALLY CLEANING GAS LINES DURING OPERATION. *Oil Gas J.*, 52, 375-379, 381, 382, 384-386 (1953) July 27; Petroleum Engr., 25, D19, 20, 22, 24, 26 (1953) October.

Presented is on economic study of Texas Eastern's procedure for cleaning while line is in operation. The method, which departs from the previous practice of shutting line down, assures continuing operation and high level of transmission efficiency. This addition of scraper traps and facilities for handling scrapers will increase construction cost of a project by approximately ½ to 1% and decreases cost of cleaning from $100-800 per mile for the shut-down method to $1 to $3 per mile. This method reduces maintenance on compressor stations, helps prevent freeze-ups by removing liquid accumulations, and results in a substantial savings in line purging. B. E. Eakin

Senatoroff, N. K. and Niederer, E., Jr. HOW SOUTHERN COUNTIES DEVELOPED METHOD FOR BLOWING DUST FROM LINES. *Gas Age*, 112, 23-26, 68, 69 (1953) July 16; *Gas*, 29, 46-49 (1953) September.

A procedure is presented for blowing transmission and distribution gas lines free of dust with-

out any shut-down or service interruption. The design and successful operation of a portable filtering unit capable of handling a flow of 350,000 MCF/hr is described. E. J. Pyrcioch

FILTER UNIT REMOVES DUST FROM DIRTY LINE. *Oil Gas J.*, **52**, 102-03 (1953) July 6.

Field tests on the use of a truck-mounted portable dust-filter unit for removing dust from gas-transmission lines and distribution networks are described. Service need not be interrupted during use. Dust concentration can be reduced from 1 to 0.1 lb./1000,000 cu ft of gas.
E. J. Pyrcioch

Methane Cracking

Hasche, R. L. (assigned to Eastman Kodak Co.) PROCESS OF PRODUCING ACETYLENE. U. S. 2,645,673 (1953) July 14.

A process for the production of acetylene rich hydrocarbon gas mixtures is described in which light hydrocarbons (methane through butane) are subjected to two stages of thermal cracking in a Hasche regenerative furnace.
J. M. Reid

Network Calculations

Trunk, E. F. and Murray, R. E. and Bruns, J. R. USE OF HARDY CROSS ANALYSIS FOR CALCULATING PRESSURES. *Gas Age*, 112, 27-31 (1953) July 30.

A procedure for calculating the pressure drop in network systems by the method of balancing heads. The calculations are described, and an example worked. B. E. Eakin

Odorization

Cline, H. L. NATURAL GAS ODORANTS. Paper No. PC-53-2 Am. Gas Assoc., Operating Section, New York, May, 1953; *Gas*, **29**, 42 (1953) July; *Petroleum Engr. (Refnc. Annual)* **25**, D-32, 33, 35 (1953) July 15.

Odorant is injected directly into the main, using electric-motor-driven combination piston-diaphragm pumps. The rate of odorant injection is maintained in direct proportion to the gas flow, as measured by a pilot-venturi flow element, by means of a pressure-control transmitter connected between a flow indicating meter and the pump. C. E. Hummel

Remington, F. PEOPLES NATURAL WINDS UP PROGRAM TO ODORIZE GAS FOR 226,000 CUSTOMERS. *Gas*, **29**, 39-42 (1953) July.

Odorization of gas in the People's system was carried out on a gradual basis by progressing from district to district. The initial experimental odorization station is described in detail.
C. E. Hummel

Pipe Crossings

Swensingsen, C. A. EMERGENCY PIPE LINE SUSPENSIONS: DESIGN AND INSTALLATION PROCEDURES. *Gas Age*, 112, 36-39, 74, 76 (1953) July 16.

In the event of the loss of a pipe-line river crossing, speedy restoration of service is essential. There are four main problems to solve: towers, suspension cable, hangers, and pipe. A chart is presented that simplifies calculations, and has been used successfully for several years. Procedures are given in detail. B. E. Eakin

Property Valuation

Davis, R. E. and Stephenson, E. A. VALUATION OF NATURAL GAS PROPERTY. *J. Petroleum Techn.*, **5**, 9-13 (sect 1) and 7 (sect 2) (1953) July.

A discussion of the engineering and economic analysis necessary to evaluate natural gas property. The determination of monetary value can only be determined from a complete geologic, engineering, and economic study of the property. B. E. Eakin

Southeast U.S. Discoveries

Baum, R. B. OIL AND GAS EXPLORATION IN ALABAMA, GEORGIA, AND FLORIDA. *Petroleum Eng. (Refnc. Annual)*, **25**, B-76, 77, 80, 82, 85, 86, 88 (1953) July 15.

The discovery of the Pollard oil field in southern Alabama early in 1952 sparked a campaign of leasing and exploration which spread quickly into Georgia and Florida. Three fields in southwestern Alabama and one in southern Florida account for all the oil production in the three states. Some aspects of the general geology and geophysics of the area, illustrated with maps, cross sections, and correlation charts, suggest the presence of geologic conditions favorable for the possible trapping and accumulation of oil and gas. Author's Abstract

Sulfur Recovery

Vlcek, J. G. and Graff, R. A. GLOBE SOLVES PRESSING AIR-POLLUTION PROBLEM WITH NEW-TYPE SULFUR-RECOVERY UNIT. *Oil Gas J.*, 52, 64-65 (1953) July 6.

A modified Claus process is used for the two-stage catalytic conversion of hydrogen sulfide in the acid gas effluent of an amine-type desulfurization unit. The sulfur recovery unit was designed to recover 15 tons per day of high purity sulfur using three process vessels. The operation of the process and the instrumentation employed are described in detail.

C. E. Hummel

Underground Storage

Roth, E. E. UNDERGROUND STORAGE OF NATURAL GAS. *Petroleum Eng.*, 25, D-86, D90-94 (1953) May.

A brief but comprehensive discussion of the uses, selection, and activation of underground storage fields is given. Equations for predicting field capacity and deliverability from engineering data pertaining to any particular field are included. J. M. Reid

GAS STORAGE STATION FOR THE DISTRICT OF COLUMBIA. *Flow Line*, 12, 4-7 (1953) May-June.

The Washington Gas Light Company's new standby and peak load station at Rockville, Maryland, is described. Facilities include high-pressure (2240 psi) natural gas storage in underground bottles with a capacity of 57 MMCF and a propane-air plant with storage capacity equivalent to 59 MMCF. The Rockville station is within a half-mile of the natural gas metering station of the company's supplier and is constructed so as to be easily integrated with any future expansion facilities. J. M. Reid

OHIO FUEL GAS' WEAVER PROJECT. *Oil Gas J.*, 52, 138, 141 (1953) July 13.

Ohio Fuel Gas Company is further developing its Weaver underground storage site by construction of additional wells to increase deliverability. A series of photographs of the Weaver project accompanied by brief descriptive material is presented. J. M. Reid

Well Practise

Nicolson, K. M. NEW LIGHT ON AIR DRILLING IN CALIFORNIA. *Oil Gas J.*, 52, 76, 78-81, 97 (1953) July 6.

Use of air for the drilling fluid has found favorable use where there is severe loss of circulation, where producing formations are susceptible to injury from drilling fluid or particle penetration and, where drilling fluid is expensive or nonavailable. The techniques at present utilize makeshift equipment converted from routine mud drilling, and much equipment and tool development will be necessary before the advantages of air drilling may be fully realized.

B. E. Eakin

Ogden, L. A., McChesny J. R. and McDonald, L. L. (assigned to The Pure Oil Company) APPARATUS FOR THE SELECTIVE INJECTION OF FLUIDS INTO GEOLOGICAL FORMATIONS. U. S. 2,643,208 (1953) June 23.

An apparatus for selective injection of fluids in geological formations utilizing collapsible envelope packings operated by gas pressure. The apparatus is applicable to earth bore or casing.

B. E. Eakin

GAS-WELL DELIVERABILITIES STEPPED UP BY NEW HIGH-PRESSURE ACIDIZATION TECHNIQUES. *Oil Gas J.*, 52, 56, 57, 90 (1953) August 3.

A process is described for increasing deliverability where formation permeability has been reduced by infiltration of mud and formation water. Large increases in deliverability are cited after injecting acid in 10 bbl. slugs separated by small volumes of high pressure gas.

R. F. Bukacek

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Dirksen, H. A. STEAM REFORMING OF NATURAL GAS. p. 181

Legatski, T. W. ABSORPTION INDEX OF NATURAL GAS. p. 187

6. PETROLEUM AND SYNTHETIC LIQUID FUELS

Catalysts

Brown, C. O. and Wainright, R. B. SYNTHETIC FLUID CRACKING CATALYSTS. *Petroleum Eng., (Refnc. Annual)* 25, C-37, 38, 40 42, 43 (1953) July 15.

The factors relating to catalyst application in the catalytic cracking of petroleum products are discussed. The factors emphasized are catalyst properties, operating conditions, and unit design. H. A. Dirksen

Marshall, J. A. and Askins, J. W. FLUID-BED CATALYTIC CRACKING UNIT. *Ind. Eng. Chem.*, 45, 1603-1608 (1953) July.

The Shell Oil Company has been using a small fluid cracking unit for studies of production yields and the effect of process variables for their plant unit. The reactor of this unit consists of a 2 in. schedule 80 stainless steel pipe 6 ft. long. The unit consumes only ⅓ to ½ gal of feed stock per min. The usual oil preheaters and catalyst regenerator, plus product recovery system completes the unit. Much data has been collected and the agreement between the small scale unit and plant units has been excellent. W. G. Bair

Rottig, W. (assigned to Ruhrchemie Aktiengesellschaft, Oberhausen-Holten, Germany) CATALYST FOR THE HYDROGENATION OF CARBON MONOXIDE. U. S. 2,647,138 (1953) July 28.

(Claim 9). The process of hydrogenating carbon monoxide mixed with hydrogen which comprises passing said mixture at a temperature ranging between about 200° and 300° C. under a pressure near atmospheric pressure across a precipitated alkali-promoted catalyst which has been reduced with reducing gas and containing metallic iron within the range of 25 and 35%, ferrous oxide within the range of about 50 and 61%, ferric oxide within the range of about 4 and 25% and an acid alkali metal orthophosphate within the range of about 0.5 and 5%, the velocity of flow of the reducing gas for the reduction of the catalyst being between about 1.3 and 1.4 meters per second, the reduction period between about 30 and 60 minutes and the reduction temperature between about 200 and 240° C.

NEW-CATALYST RESULTS. *Oil Gas J.*, 52, 64, 65 (1953) July 20.

Test runs are reported for naphthas from Mid-Continent Venezuela, Kuwait and Pennsylvania crudes. The platinum catalyst (reported in Oil Gas J., April 27, p. 131) permits operation at low pressure with catalyst regeneration or at moderate pressure under continuous operating conditions in pilot-plant operations of the catalytic reforming process. H. A. Dirksen

Desulfurization

Arnold, R. C. and Lien, A. P. (assigned to Standard Oil Co.) DESULFURIZATION OF DISTILLATE FUELS. U. S. 2,646,390 (1953) July 21.

A process for refining high-sulfur petroleum oils boiling in the temperature range 300°-650° F is claimed. The process is carried out at -20° to -40° C and under pressure, contacting the distillate with 25 to 50 volume percent of liquid SO_2 and anhydrous aluminum chloride in an amount of 1 to 2 gram moles per gram atom of sulfur. Data indicate that a desulfurization of at least 63% is claimed. H. A. Dirksen

Fischer-Tropsch

Kendall, M. T. (assigned to The Texas Co.) HYDROCARBON SYNTHESIS. U. S. 2,646,-442 (1953) July 21.

Improved liquid yields are claimed in the hydrogenation of carbon monoxide using iron catalyst when the catalyst particle size in the reaction zone is maintained between 10 and 80 microns. J. M. Reid

Future Processing

Swanson, P. F. and Adams, N. R. PETROLEUM PROCESSING. *Ind. Eng. Chem.*, 45, 1429-1435 (1953) July.

Future petroleum processing will see vast expansion and many improvements in the basic processes. These changes will be made princi-

pally through extensive usage of catalytic and fluid principles. In general, the refinery of the future will be larger, more complex, and more completely integrated than in the past. This will make possible relative savings in initial investment and more efficient over-all refinery operation. In addition to improved basic processes, many entirely new processes are envisioned. These will be based principally upon the present petrochemical and synthetic type processes. Many new and improved products will be developed and present products will be available in greatly increased quantities.

Authors' Abstract

Liquid Fuel Economy

Ayres, E. THE LONG-RANGE OUTLOOK FOR LIQUID FUELS IN AMERICA. Presented at 2nd Amer. Power Conf. Chicago, March 25, 1953. Proc. Amer. Power Conf. **15**, 193-200 (1953); *Petroleum Refiner* 32, 90-93, 223, 224 (1953) August.

An explanation of various terms used by predictors of the future of liquid fuel supply, and their consistently under-estimated data of demand and supply is made by an expanded study of United States and world production. Estimates of the time of peak production, based on 100 and 200 billion bbl. ultimate recoverable reserves are 1960 and 1970 respectively, for the United States. Peak production of 2.5 and 3.5 billion bbls. per year, respectively are extrapolated. Similar estimates of peaks are discussed for world production. Use of residual oil as crude fuel has begun to diminish since 1950 and will disappear before extensive oil-shale retorting and coal converting operations are developed. O. P. Brysch

Egloff, G. THE EFFECT OF OIL UPON AMERICAN INDUSTRY. *Petroleum*, **16**, 192-195 (1953) July; IMPACT OF OIL ON OUR ECONOMY. *Petroleum Engr. (Refnc. Annual)* **25**, E2-4, E6-8 (1953) July 15.

A complete review of the growth and resources of the American oil industry. The article highlights the progress that has been made in new processes and in broadened applications of petroleum products. W. G. Bair

Kemp, L. C., Jr. and Atwell, H. V. PETROLEUM SUPPLEMENTS. *Ind. Eng. Chem.*, 45, 1436-1440 (1953) July.

This is an extensive survey of the synthetic fuel situation. Demand for natural gas substitutes and synthetic liquid fuels will probably grow simultaneously, since reserves of natural gas and petroleum are of the same order of magnitude. Shale oil recovery needs lower mining costs, better retort design. Direct (Bergius) hydrogenation of coal needs better primary stage catalysts, cheaper hydrogen sources and more selective conversion. Late developments in hydrocarbon synthesis, as well as coal carbonization, underground coal gasification, fuels from agricultural products and bituminous sands are all discussed with their economic considerations. E. B. Shultz, Jr.

Storch, H. H. SYNTHETIC LIQUID FUEL PROCESSES. *Ind. Eng. Chem.*, 45, 1444-1455 (1953) July.

A brief review is presented of some problems in the catalytic steps of processes for the conversion of oil shale and coal to liquid fuels.

W. J. Pleticka

Oil Storage

Guthrie, V. B. OLD QUARRIES FOR OIL STORAGE. *Petrol. Processing*, 8, 1168-69, (1953) August; PIT OIL STORAGE — WHAT IT MEANS TO MARKETERS. *National Petroleum News*, **45**, 11, 12 (1953) July 29.

Disadvantages such as location, capacity, and roof are listed. The advantages of stable markets, less cut backs, more efficient plant operation and tankage utilization are presented for the "Hole-in-the-ground" oil-product storage study by Esso Standard Oil Co.

H. A. Dirksen

REDUCE EVAPORATION LOSSES 80 TO 90 PERCENT. *World Oil*, **137**, 211-213 (1953) August 1.

A reduction of some hundreds of millions of dollars annually in the storage loss due to evaporation is predicted for the refining and pipeline industries by Standard Oil Co. (Ohio). This is accomplished by a one-inch layer of balloon-like spheres containing a sealed-in gas,

usually nitrogen. These millions of hollow spheres range in size from 2/10,000 to 36/10,000 of an inch and form a foam blanket that floats on oil inside the storage tanks.

H. A. Dirksen

Refinery Wastes

Shiffler, W. H. (assigned to California Research Corp.) GASIFICATION OF SULFURIC ACID WASTES. U. S. 2,644,797 (1953) July 7.

Sulfuric acid wastes such as acid sludge from petroleum refining is burned with an amount of oxygen insufficient for complete combustion but sufficient to completely gasify the material with the formation predominantly of carbon monoxide, hydrogen, and hydrogen sulfide. Air enriched to an oxygen content of 65 to 95%, with combustion temperatures above 2200° F but preferably above 2500° F. is used.

D. M. Mason

Shale Retorting

Alleman, C. E. (assigned to Phillips Petroleum Co.) PROCESS FOR DESTRUCTIVE DISTILLATION. U. S. 2,647,077 (1953) July 28.

Four separate fluidized beds are used for close temperature control and good heat recovery. Heating in each of the four vessels is done by direct contact with gases in a fluid bed. Flue gas heats crushed shale (40 mesh or smaller) to 450°F in the preheating zone. Non-condensible products of destructive distillation are used to strip the preheated oil shale in the stripping zone at 825 to 1050° F. Residual carbon is burned out of the shale in a combustion zone, yielding flue gas for the preheater, and hot spent shale for a stripping-gas heating zone. Off-gas from the stripping zone is separated into shale oil, and the non-condensible stripping gas. The process is claimed to work with other carbonaceous materials also.

E. B. Shultz, Jr.

Holford, H. J. and Challis, A. J. (assigned to Holford Processes Ltd.) VERTICAL SHALE RETORT. U. S. 2,645,609 (1953) July 14.

This British designed scheme for destructive distillation of oil shale, cannel coal or oil-bearing sands calls for vertical, cylindrical retorts arranged in double rows. Each retort shaft is surrounded by a jacket space within which hot gases pass upwards. Heat is conducted through the retort shell to the material to be carbonized, which is charged batchwise at the shaft top. Spent shale is water-quenched at the shaft bottom and is taken by endless conveyor to an oil separator. Off-gas is recovered and used to heat the retorts.

E. B. Shultz, Jr.

West Canada Oil

Lee, C. S. and Young, R. O. ENTRY INTO OIL OPERATIONS IN WESTERN CANADA. *J. Inst. Petroleum*, 39, 383-428 (1953) July.

Since 1947, the progress and development of oil in Western Canada has become a matter of first importance to the oil industry in all parts of the world. This paper reviews the conditions under which this development is taking place and discusses legislative, financial, and practical problems which will face any company intending to participate. Particular attention is paid to the regulations governing the acquisition of reservations and leases from the Provincial Governments wherein the greater part of the mineral rights are vested. The geography, history, and constitution of Canada are related to the general development. A considerable section of the paper is devoted to the classification of the companies and the types of deals and negotiations which are conducted between them. It concludes with a comparison between the Western Canadian and the Venezuelan oil development. Authors' Abstract

7. ANALYTICAL METHODS AND TESTS

Absorption Index

Legatski, T. W., Tooke, J. W., and Grundy, L. A. ABSORPTION INDEX: A SIMPLE TEST FOR AN IMPORTANT PROPERTY OF NATURAL GAS. *Oil Gas J.*, 52, 266, 67 (1953) July 27.

A new method for testing natural gas, which has been designated the absorption index test, is described. The test consists of measuring the equilibrium pressure developed when 40 vol-

umes of gas sample is mixed with 1 volume of pure normal octane at 760 mm.Hg initial pressure and 100°F. In the testing of 34 natural-gas sample of widely different hydrocarbon compositions the results are shown to be directly related to the "butane and heavier" content of the sample gas. This test may be used to predict the butane- and heavier-content of a natural gas with a precision of plus-minus 5 per cent based on fractional analysis.

Authors' Abstract

Hydrocarbon Analysis

Rampton, H. C. METHODS OF HYDROCARBON TYPE ANALYSIS. *J. Inst. Petroleum* (British), **39**, 305-334 (1953) June.

The preferred methods of hydrocarbon type analysis are presented, together with their scope and applicability, their limitations, and indications of the aims and trends of research either in progress or contemplated in the future. Compositions of naphtha and kerosine cuts from a variety of crude oils, determined by these methods, are included, and applications in the control of manufacture of special products instanced. Specimen analyses of cracked gasolines of various types are given for comparative purposes. The influence of sulphur content on hydrocarbon type analysis in the gas oil boiling range is considered and assessments of gas oil composition made.

Author's Abstract

Nitrogen in Distillates

Ward, L. F., Jr., Moore, R. T. and Ball, J. S. NITROGEN COMPOUNDS IN DISTILLATE FUELS. *Anal. Chem.* **25**, 1070-1072 (1953) July.

Some nitrogen compounds cause instability in distillate fuels. So an analytical scheme for total nitrogen, basic nitrogen and pyrrole nitrogen compounds in petroleum distillates was developed. Thirty-four samples representative of various geographical origins and processing methods were studied. Catalytically and thermally cracked stocks can be differentiated on the basis of the types of nitrogen compounds present. A simple test to distinguish straight-run, thermally cracked and catalytically cracked distillates is also suggested. E. B. Shultz, Jr.

Optical Methods

Foote, P. D. OPTICS IN PETROLEUM PROCESSING. *Petroleum Processing*, 8, 694-699 (1953) May.

A short review is presented of the uses of infrared, ultraviolet, and emission spectroscope and related optical devices which are currently in use in the petroleum industry.

D. V. Kniebes

Shale Oil Analysis

Mapstone, G. E. STUDIES IN SHALE OIL. PART II. SOME MISCELLANEOUS STUDIES. *J. Inst. Petroleum* (British), **39**, 354-380 (1953) June.

Tar bases from thermal cracking of shale oil were shown to contain about 1.5 mole percent olefinic side chains. The methanol extract of crude shale oil contained quantities of tar bases. Indoles (pyroles) were detected in shale oil, and a new test for them is described, based on the formation of a brownish purple color with quinone. Emulsibility of crude shale oil is decreased by removing tar bases by an acid wash. The results of heating crude shale oil with sulfuric acid suggests that this treatment cannot be used as the basis for hydrocarbon type analysis. E. B. Shultz, Jr.

Spectrometric Methods

Stearns, E. I. MODERN TRENDS OF ABSORPTION SPECTROPHOTOMETRY IN THE ULTRAVIOLET AND VISUAL REGIONS. *Anal. Chem.*, **25**, 1004-1010 (1953) July.

This review paper presents some of the modern trends toward newer methods of analysis, although the well-known standard methods still comprise the bulk of visual and ultraviolet analyses. A trend away from standard measurement procedures is illustrated by use of an absorbing reference solution to get increased precision. A trend toward complexity of solution preparation is illustrated by the variable reference solution technique. A trend toward complexity in analysis of data is illustrated by the determination of empirical formulas of complexes. Illustrations are given of reflectance and fluorescence emission analysis. As a result

of this diversification of methods, the spectrophotometric method can be applied to a larger variety of analytical problems.

Author's Abstract

Spectroscopic Methods

TRANSACTIONS OF THE JOINT COMMISSION FOR SPECTROSCOPY. *J. Opt. Soc. Amer.*, 43, 410-430 (1953) May.

This meeting was held in Rome, September 9-11, 1952, sponsored by the International Astronomical Union, International Union of Pure and Applied Physics and the International Council of Scientific Unions, when technical proceedings and reports of eight subcommittees were discussed by the participating scientists. The fact that not many conclusions were reached denotes the magnitude and the difficulties of the problems attacked. Two papers presented at this meeting, "The Dispersion of Standard Air" by B. Edlen and "On the Carbon Flame Method and its Application to the Excitation of Pure Band Spectra" by A. Gatterer, constitute highly scientific contributions in their field. These are reprinted in this journal issue *(J. Opt. Soc. America)* on pages 339 and 345 respectively. S. Sensi

Sulfur Determination

Gouverneur, P. and van Dijk, H. A RAPID COMBUSTION TECHNIQUE FOR THE DETERMINATION OF SMALL AMOUNTS OF SULPHUR AND HALOGENS IN ORGANIC LIQUIDS. *Analytica Chimica Acta*, 9, 59-65, (1953) July.

Dropwise introduction of sample with the Shell-Braun quartz tube combustion unit is described.

D. M. Mason

Water Determination

Belcher, R. and West, T. S. A NEW REAGENT FOR THE TITRATION OF WATER. *J. Chem. Soc.* (British) 1772-1776 (1953) June.

A solution of sulfur dioxide and bromine in chloroform is used for the determination of water similarly to the Karl Fischer reagent. The results are more nearly stoichiometric than are those obtained with the Karl Fischer reagent. The visual end point is as satisfactory as the potentiometric. The main disadvantage is that alcohols interfere. D. M. Mason

X-Ray Methods

Cosslett, V. E. and Nixon, W. C. THE X-RAY SHADOW MICROSCOPE. *J. Appl. Physics*, 24, 616-623 (1953) May.

This is an application or combination of known principles; it does not give particularly important results. S. Sensi

Heavens, O. S. X-RAY CRYSTALLOGRAPHY. *Laboratory Practice*, 2, 229-235 (1953) May.

The application of X-ray studies to the characterization of crystals, metals, and the more difficult problems consisting of amorphous solids and liquids are discussed. Some of the uses of the X-ray method, its beam control and diffraction, and reproduction of patterns are described. S. Mori

Jones, C. K. A HIGHLY STABLE AUTOMATIC X-RAY DIFFRACTION APPARATUS WITH ONLY ONE MOVING PART. *Rev. Sci. Instruments*, 24, 380-387 (1953) May.

The fluctuation of intensity of a beam from an x-ray tube causes scattered and intermittent irregularities around and in a curve. That is due to the line voltage instability and to focal-spot shifting in the x-ray tube itself. It is claimed that by the use of an ionization gage, the incident intensity can be kept constant, and consequently the focal-spot shifting eliminated. Although the idea has been worked out since 1944 by Harey, Smith and Harding, its practical application has been reached only now and seems to be quite successful. S. Sensi

8. GENERAL AND PHYSICAL CHEMISTRY

Ammonia Synthesis

Adams, R. M. and Comings, E. W. EXPERIMENTAL REACTION RATES IN THE SYNTHESIS OF AMMONIA. *Chem. Eng. Progress*, 49, 359-366 (1953) July.

Catalytic isothermal synthesis of ammonia from H_2-N_2 mixtures was studied at total pressures of 100, 200 and 300 atm, reactor temperatures of 350°-500° C., and space velocities of 10,000-125,000 hr^{-1}. Based on a proposed mechanism

of nitrogen adsorption on the iron catalyst surface, correlations of reaction rate with pressure, temperature, space velocity and feed composition were found to be unsatisfactory. Attempt has been made to use the experimental data for reactor design. S. Hu

Harrison, R. H. and Kobe, K. A. THERMODYNAMICS OF AMMONIA SYNTHESIS AND OXIDATION. *Chem. Eng. Progress*, **49**, 349-353 (1953) July.

Values of the thermodynamic functions involved in the synthesis and oxidation of ammonia have been calculated from the most reliable data in the literature up to 1500° C. S. Hu

C-H-O Ignition

Dixon-Lewis, G. and Linnett, J. W. THE OXIDATION OF MIXTURES OF HYDROGEN AND CARBON MONOXIDE. Part 1. THE SECOND EXPLOSION LIMITS OF MIXTURES OF HYDROGEN, CARBON MONOXIDE AND OXYGEN IN A POTASSIUM CHLORIDE COATED SILICA VESSEL. *Faraday Soc. Trans.* (British), **49** 756-765 (1953) July.

The second limits of hydrogen + carbon monoxide + oxygen mixtures have been examined at temperatures between 510 and 580° C. The effect of varying the ratio of combustible gas (H_2 + CO) to oxygen is two-fold. Until about 90% of the hydrogen is replaced by carbon monoxide the limit is raised towards higher pressures and the latter gas behaves approximately as an inert gas like nitrogen. As still more carbon monoxide is added, however, the limit falls off more and more rapidly as the amount of hydrogen in the mixture is decreased, and some new chain breaking reaction becomes important. The effect of varying the ratio of combustible gas to oxygen has also been studied. A possible reaction mechanism is suggested which is a simple extension of the now widely accepted mechanism for the hydrogen + oxygen reaction. Authors' Abstract

Dixon-Lewis, G., Linnett, J. W. and Heath, D. F. THE OXIDATION OF MIXTURES OF HYDROGEN AND CARBON MONOXIDE. Part 2. THE SECOND EXPLOSION LIMITS OF MIXTURES OF HYDROGEN, CARBON MONOXIDE AND OXYGEN IN A CLEAN SILICA VESSEL. *Faraday Soc. Trans.* (British), **49**, 766-771 (1953) July.

The second explosion limits of a variety of hydrogen + carbon monoxide + oxygen mixtures have been determined in a clean silica vessel. If, for the limit mixtures, the partial pressures of combustible gas (H_2 + CO) are plotted against the partial pressures of hydrogen + oxygen second limits in boric acid coated vessels. The reaction mechanisms suggested by Hinshelwood and by Lewis and von Elbe cannot explain the shapes of these curves. Egerton and Warren have accounted for them by introducing into the reaction scheme the atom-radical process, H + HO_2 = 2OH. We have also included this process in our scheme. However, to account for our results and those of Egerton and Warren, we have found it necessary to reconsider the part played by the vessel wall. Authors' Abstract

Carbon-Oxygen

Klein, R. INVESTIGATION OF THE SURFACE REACTION OF OXYGEN WITH CARBON ON TUNGSTEN WITH THE FIELD EMISSION MICROSCOPE. *J. Chem. Physics*, **21**, 1177-1180 (1953) July.

From studies on the patterns obtained from the tungsten surfaces using a field emission microscope, the graphite oxidation reaction was studied. The rate controlling step was the breaking of the chemisorption bond between the tungsten surface and oxygen atom. S. Mori

Carbon Surfaces

Walker, P. L. and Wright, C. C. ADSORPTION-DESORPTION STUDIES OF NITROGEN, ARGON, AND CARBON DIOXIDE ON CARBON RODS. *Ind. Eng. Chem.*, **45**, 1715-1721 (1953) August.

The results of the authors' studies indicate that the area available to an inert molecule at high temperature should be greater than the area available to the same molecule at low temperature. Reacting gases, however, only use that portion of the total carbon surface that is necessary to maintain the reaction rate at a given temperature. G. V. Vosseller

Catalyzed Reactions

Schmerling, L. REACTIONS OF HYDROCARBONS. *Ind. Eng. Chem.*, **45**, 1447-1455 (1953) July.

The hydrocarbon reactions catalyzed by the large class of substances that may be called acid-type catalysts can best be explained as occurring by way of carbonium ion, usually chain, mechanisms. These acid-type catalysts include acids, the Friedel-Crafts halides, and oxides. All presumably owe their activity to ability to cause the formation of carbonium ions under the reaction conditions. The carbonium ions behave according to certain rather generally accepted principles, resulting in the formation of the observed products. These principles have been applied to some typical petroleum hydrocarbon reactions, including the polymerization and isomerization of olefins, the alkylation of isoparaffins and of aromatic hydrocarbons, and cracking. It is probable that the alkylation of aromatic hydrocarbons occurs not only by an electrophilic mechanism but also by a nucleophilic displacement mechanism.

Author's Abstract

Diffusion

Schwertz, F. A. SEPARATION OF GASES BY FREE DOUBLE DIFFUSION. *Ind. Eng. Chem.*, **45**, 1592-1596 (1953) July.

Experiments were carried out on the separation of gases by free double diffusion by means of a porous barrier and the results were satisfactorily correlated by introducing two arbitrary constants into the theoretical equations for the ideal case where no barrier is present.

S. Hu

Hydrogen Compressibility

David, H. G. and Hamann, S. D. THE QUANTUM BEHAVIOR OF COMPRESSED GASES. *Faraday. Soc. Trans.*, (British) **49**, 711-716 (1953) July.

The pressure-volume relationships of hydrogen and deuterium have been studied at 64.5° K and 78.9° K and at pressures between 150 and 1250 atm. The results show a marked quantal inflation of the pressure which is in good agreement with the predictions of a quantized Lennard-Jones and Devonshire theory of the gases.

Authors' Abstract

Maslan, F. D. and Littman, T. M. COMPRESSIBILITY CHART FOR HYDROGEN AND INERT GASES. *Ind. Eng. Chem.*, **45**, 1566-1572 (1953) July.

The compressibility chart for hydrogen is constructed using experimental data from the literature. From this chart, compressibility factors of helium, neon and argon can be obtained by using arbitrarily determined pseudocritical constants. The chart is accurate for hydrogen, but the average error in the compressibility factor of the other 3 gases is 1.4%.

D. C. Gami

Nitric Oxide Manufacture

Pike, R. D. METHOD FOR MAKING NITRIC OXIDE. U. S. 2,643,936; 937 (1953) June 30.

Method for making nitric oxide using reactors characterized by unsymmetric temperature cycles, larger heat transfer pebbles, and greater gas turbulence in the cooling section as described in these patents is said to give better yields, less restricted flow in the bed, and less abrasion to the heat transfer pebbles.

S. Mori

Oxidation Mechanism

Small, N. J. and Ubbelohde, A. R. THE INFLUENCE OF MOLECULAR STRUCTURE ON THE OXIDATION OF ALIPHATIC HYDROCARBONS. *J. Appl. Chem.* (British), **3**, 193-198 (1953) May.

The mechanisms of low temperature oxidation are discussed from the standpoint of molecular structure, and bond energies for various classes of aliphatic hydrocarbons. The authors conclude that the various critical processes center around the fate of $RO_2\cdot$ formed from:

$$R. + O_2 = RO_2\cdot$$

and regard this as a controlling factor in determining the influence of molecular structure on the uncatalyzed oxidation of hydrocarbons.

G. V. Vosseller

Resonance Energy

Glockler, G. BOND ENERGIES AND BOND DISTANCES OF HYDROCARBONS. *J. Chem. Physics*, **21**, 1242-1248 (1953) July.

Equations relating carbon-carbon and carbon-hydrogen bond distances and energies are de-

rived. Examples are given of using these equations to find a distribution of the atomic heat of formation over the various bonds of a molecule. D. V. Kniebes

Glockler G. RESONANCE ENERGIES OF BENZENE AND BUTADIENE. *J. Chem. Physics*, 21, 1249-1254 (1953) July.

The resonance energy of benzene based on an ethane-ethylene-like Kekule structure is 74.86 kcal. The similar quantity for butadiene is 17.28 kcal. These quantities are independent of the value of the heat of sublimation of carbon. They are obtained from the heats of atomization of the appropriate molecules or from the heats of hydrogenation of the pertinent related compounds. Both methods yield the same results if properly applied. Author's Abstract

9. ORGANIC CHEMISTRY

Acetone Cracking

Daroux, W. G. PRODUCTION OF ACETIC ANHYDRIDE FROM ACETONE. *J. Appl. Chem.* (British), 3, 241-252 (1953) June.

A pilot plant and full scale plant design for the production of acetic anhydride is described in some detail. Acetone is thermally cracked in a type 310 stainless steel coil at 1200 to 1500°F and at high mass velocities in the range of 10 to 30 ft lb sec units and thereafter quenched immediately with acetic acid to freeze out the keten. The reaction of keten with acetic acid produces acetic anhydride. It was found in the pilot plant investigations that the molar yield of keten decreases with increased percent conversion of acetone during the cracking step, making conversions of greater than 50 per cent uneconomical. It is also pointed out that through the use of acetone as a raw material and the general character of the process this operation is quite expensive.

J. M. Reid

Benzene from Naphtha

ATLAS GASOLINE-UPGRADING PLANT PRODUCES BETTER-THAN-NITRATION-GRADE BENZENE. *Oil Gas J.*, 52, 105-108, 117 (1953) July 13.

A report on the first gasoline processing plant of its kind to produce nitration grade benzene. The raw charge is 400°F-end-point naphtha extracted from natural gas of the Carthage gas field. Because of the absence of cracked materials and sulfur, the benzene produced is of high purity and requires no treatment such as acid washing, caustic washing and dehydration.

H. A. Dirksen

Ethylene Demand

Cornell, P. W. ETHYLENE. *Chem. Eng. News*, 31, 2957-2960 (1953) July 20.

This dissertation about ethylene predicts favorable future demands, despite the competition of acetylene and the problems of transportation. Indicative of this are the numerous methods of production and purification of ethylene, with an economical process for any particular situation. A. J. Tulis

Hydrazine

TOUGHER THAN IT LOOKS. *Chem. Week*, 73, 42, 44, 46, 48 (1953) July 18.

Mathieson Chemical Co. has brought into production the new hydrazine plant, which employs a modified Raschig process. The price is expected to be 50¢ a pound as compared with the present price of about $3.00/lb. for the 94% purity material. W. J. Pleticka

H_2S Reactions

Bell, R. T. (assigned to The Pure Oil Co.) PRODUCTION OF METHANETHIOL. U. S. 2,647,151 (1953) July 28.

In the production of mercaptans by reaction of hydrogen sulfide with alcohols, formation of sulfides is suppressed by the addition of small amounts of hydrogen to the reaction mixture.

D. M. Mason

Cairns, T. L., Larchar, A. W., and McKusick, B. C. REACTIONS OF HYDROGEN SULFIDE WITH VARIOUS ORGANIC COMPOUNDS AT HIGH PRESSURES. *J. Org. Chem.*, 18, 748-752 (1953) June.

Hydrogen sulfide has greatly increased reactivity at a pressure of 8500 atmospheres. At this pressure it can convert such compounds as methyl formate, ethyl acetate, acetamide, and cyclohexanone oxime to alkyl polysulfides. Moreover, several previously known reactions of

hydrogen sulfide are facilitated by such a pressure. Authors' Abstract

Nomenclature

Alexander, M. PROGRESS REPORT: PETROCHEMICALS ACQUIRING UNIFORM NOMENCLATURE. *Oil Gas J.*, **52**, 341-350 (1953) July 27.

This article is a report on progress made to date in establishing uniform nomenclature for chemical compounds, with emphasis on petrochemicals. Rules for nomenclature of paraffin hydrocarbons and cyclic hydrocarbons are tabulated by subject and bibliographic references; the rules themselves are too voluminous to present in this form. A. E. S. Neumann

10. CHEMICAL ENGINEERING

Absorption

Woolcock, J. W. (assigned to Imperial Chemical Industries Limited) TREATMENT OF GASEOUS MIXTURES. U. S. 2,642,154 (1953) June 16.

An improvement is claimed in the regeneration step of gas absorption processes employing liquid solvents. By mixing the rich solvent with an inert liquid which forms a single phase at the regeneration temperature and two phases at the absorption temperature, increased regeneration efficiency is claimed through increase in the partial pressure of the gas absorbed. Regenerated solvent is separated from the inert liquid in the two-phase stage of the system before being used for further absorption. J. M. Reid

Adsorption

Askevold, R. J. (assigned to The Pure Oil Co.) SEPARATION OF ALCOHOLS FROM MERCAPTANS. U. S. 2,647,150 (1953) July 28.

Adsorption methods for separating alcohols from mercaptans are described.

D. M. Mason

Fluidized Reactor

Lassiat, R. C. and Savage, R. T. (assigned to Houdry Process Corp.) ART OF HANDLING FLUENT PARTICLES. U. S. 2,646,407 (1953) July 21.

Details are presented for a reactor design which will produce a uniform particle-size distribution in a catalyst bed. The method employs an integral catalyst-supply hopper in the top of the reactor, connected to the reaction bed by numerous stand pipes disposed in a pattern to produce the desired uniform distribution.

W. G. Bair

Thompson, R. B. A NEW APPLICATION OF FLUIDIZATION. *Chem. Eng. Progress*, **49**, 253- 256 (1953) May.

Successful application of the principles of fluidization to the roasting of pyrite and pyrrhotite has made it possible to produce, in actual plant scale, bisulfite acid liquors of sufficient strength for the manufacture of paper pulp.

S. Hu

Gas-Solid Dynamics

Zenz, F. A. VISUALIZING GAS-SOLID DYNAMICS IN CATALYTIC PROCESSES. *Petroleum Refiner*, **32**, 123-128 (1953) July.

The physical characteristics of fluid beds and solids transport lines are discussed. Diagrams and plots aid in visualization of the bed conditions. A lengthy bibliography is included.

W. G. Bair

Heat Transfer

Lohrisch, F. W. HEAT TRANSFER COEFFICIENTS IN WATER TUBE CONDENSERS. *Gas Times* (British) **76**, 601-609 July 10; 664, 669, 670 (1953) July 24.

The method of Colburn and Hougen is applied for designing condensers for cooling mixtures of vapors with non-condensing gases. Graphs are presented which eliminate much of the laborious computation needed with this method. Equations are given upon which the graphs are based. W. G. Bair

Payne, J. W., Lechthaler, C. H. and Drew, R. D. COUNTERCURRENT HEATING AND COOLING OF GRANULAR SOLIDS WITH GASES. *Ind. Eng. Chem.*, **45**, 1233-1236 (1953) June.

Several applications of gas-solids heat interchange in commercial and laboratory equipment

are discussed, as well as problems encountered. No new or modified correlative methods are presented. G. V. Vosseller

Pneumatic Conveying

Clark, R. H., Charles, D. E., Richardson, J. F. and Newitt, D. M. PNEUMATIC CONVEYING. PART I: THE PRESSURE DROP DURING HORIZONTAL CONVEYANCE. *Inst. Chem. Eng. Trans.* (British), **30**, 209-224 (1952)

A study and analysis of the pressure drops in a horizontal conveyance system where solid particles were carried in an air stream was made. This represents one phase in the study of solid-air flow in order to obtain data for the design and operation of pneumatic conveying equipment. Tests were conducted in a pilot plant with 1 inch diameter lines with lengths of pipe up to 45 feet and pressure tappings at suitable intervals in the line. Measurements were made over a range of air velocities and solid feed rates to determine the additional pressure drop caused by the pressure of different solids in the air stream. The experimental data for the five solid materials used in the tests is correlated and a curve is presented for determining the total pressure drop for the five materials for the ranges of air velocity and solid feed rate used in the tests.
E. J. Pyrcioch

Reactor Design

Hunter, J. A., Jr. SOLVE FOR VESSEL THICKNESS GRAPHICALLY. *Petroleum Refiner*, 32, 112, 113 (1953) July.

A graphical method is presented for the design of vessel and head thicknesses for internal pressure vessels, based on the standard code equations. C. G. von Fredersdorff

11. PROCESS EQUIPMENT AND INSTRUMENTATION

Ammonia Scrubbers

Otto, C. AMMONIUM SULFATE PRODUCTION. U. S. 2,645,559; PRODUCTION OF SULFATE OF AMMONIA: U. S. 2,645,560 (1953) July 14.

Two types of spray-tower scrubbers for removal of ammonia from coke oven gas are described. Both utilize sprays of ammonium sulfate solution containing acid and crystals, with a liquor settling zone below and a special screen-baffle above the spraying zone. O. P. Brysch

Control by Infrared

Berger, D. E. CONTINUOUS CONTROL OF PLANT STREAM BY INFRARED ANALYZER. *Instruments*, **26**, 872, 873, 903, 904 (1953) June.

Important factors in the application of infrared analyzers for continuous monitoring and control of a plant stream include (1) the economic effects of inadequate composition control, (2) sampling points, (3) automatic control factors, (4) methods of sample presentation, and (5) presentation of the analysis to operating personnel. Author's Abstract

Kratochvil, K. V. and Berger, D. E. CATALYST REGENERATION CONTROL. *Petroleum Eng.*, **25**, C13-C15 (1953) July.

The use of an automatic infrared analyzer to control the regeneration of dehydrogenation catalyst is described. E. J. Pyrcioch

Heat Exchangers

Bridges, F. L. PLATECOIL HEAT TRANSFER UNITS. *Chem. Eng. Costs Quarterly*, 3, 65-82 (1953) July.

A short discussion of platecoil heat transfer units. These units are made by spot welding two embossed plates together to form the passage way for the fluid to be heated or cooled. Much less metal is required than in the conventional pipe coil, and the resultant product is cheaper and lighter. Heat transfer coefficients for platecoils are much higher than for conventional pipe coils. W. G. Bair

Hepp, H. J. (assigned to Phillips Petroleum Co.) PEBBLE HEAT EXCHANGE CONVERSION PROCESS. U. S. 2,645,606 (1953) July 14.

The invention relates to a new pebble heater apparatus designed for hydrocarbon conversion. The main feature of the apparatus is the large cylindrical reactor and heat exchange vessel. The hydrocarbon feed is introduced at

the bottom of the vessel and passes upward countercurrent to the descending hot pebbles. A restriction or throat is built into the vessel about the mid point. O_2 or O_2 containing gases are introduced here to burn a portion of the hydrocarbon fuel and thus supply the necessary heat of reaction. Products of combustion and cracked hydrocarbons are withdrawn from the top of the vessel. Low carbon deposition is claimed. Specific figures are given for the conversion of ethane to ethylene. W. G. Bair

Maintenance Efficiency

HOW TO EVALUATE YOUR MAINTENANCE. *Petroleum Processing*, 8, 1056, 1058, 1060 (1953) July.

The various factors affecting maintenance costs are discussed based on an intensive survey by a large company in the wet corn milling industry. It is concluded that the efficiency of a maintenance program can not be evaluated by cost figures alone because of the large number of variables involved in procuring cost data.

J. M. Reid

Pyrometry

Millar, G. H., Winans, J. G., Uyehara, O. A. and Meyers, P. S. A FAST ELECTRO-OPTICAL, HOT-GAS PYROMETER. *J. Optical Soc. America*, 43, 609-617 (1953) July.

The design, development, and theory of a fast electro-optical pyrometer applicable to flame temperature measurements is presented. Particular feature of this design is its applicability to flames having a continuous spectrum.

S. Mori

Stedman Column Costs

Bragg, L. B. STEDMAN PACKED COLUMNS. *Chem. Eng. Costs Quarterly*, 3, 84-90 (1953) July.

Advantages of the Stedman packed columns are discussed, such as the large number of theoretical plates per foot of packing, low liquid hold-up and low pressure drop per plate.

W. J. Pleticka

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Cline, H. L. NATURAL GAS ODORANTS. p. 183

Knaplund, P. PUNCHED CARD EQUIPMENT. p. 173

12. MATERIALS OF CONSTRUCTION

Coatings

Ferguson, W. C. (assigned to The Presstite Engineering Company) PLASTIC-COATED PIPE AND PIPE FITTING. U. S. 2,646,822 (1953) July 28.

A pipe fitting allowing plastic-coated pipe to be field assembled in such a manner as to form a continuously coated outer surface.

B. E. Eakin

Miltner, D. E. EXAMINATION OF 335 MILES OF ASPHALT MASTIC COATED PIPE. *Corrosion*, 9, 210-215 (1953) July.

335 miles of continuously applied asphalt mastic coated pipe laid in 1941 has been examined by an extensive and systematic coating survey. This report outlines the methods of test employed in the examination; describes the test results, details typical coating failures found by inspection and discusses the coating behavior with particular reference to the prolonged effect of cathodic protection.

Author's Abstract

Corrosion

Larrabee, C. P. CORROSION RESISTANCE OF HIGH-STRENGTH LOW-ALLOY STEELS AS INFLUENCED BY COMPOSITION AND ENVIRONMENT. *Corrosion*, 9, 259-271 (1953) August.

The corrosion resistances of several high-strength low-alloy steels in various atmospheres, in natural waters and in soil are compared with those of structural copper steel and structural carbon steel in the same environments. The effects of the many variables that influence the corrosion of these steels in the different media are fully discussed. 41 references. Author's Abstract

LaQue, F. L. and Boylan, J. A. EFFECT OF COMPOSITION OF STEEL ON THE PER-

FORMANCE OF ORGANIC COATINGS IN ATMOSPHERIC EXPOSURE. *Corrosion*, **9**, 237-241 (1953) July.

The study described was directed towards the possibility of reducing corrosion of automobile bodies by the use of steels containing alloying elements added to improve resistance to atmospheric corrosion. The types of steel used were an exceptionally low copper content, a representative copper bearing steel (0.2 per cent Cu), a commercial low alloy high strength steel of the nickel copper type, a commercial low alloy high strength steel of the chromium, nickel, silicon, phosphorus, copper type, an experimental steel containing 0.5 per cent nickel plus copper, and a steel supposed to be a representative of standard automobile body stock. Specimens 4 by 6 inches were exposed under eight conditions to four different atmospheres.

J. G. Chalcraft

Schwerdtfeger, W. J. LABORATORY MEASUREMENT OF THE CORROSION OF FERROUS METALS IN SOILS. *J. Res. Nat. Bur. Standards*, **50**, 329-336 (1953) June.

Soil resistivity as an index for the corrosive property of a particular soil is complicated by changes in its corrosive rates with time. To overcome such difficulties, corrosion testing procedures have been developed which appear to correlate with field tests equivalent to 10 year periods of exposure. S. Mori

Van Der Hoefen, H. W. HOW TO SELECT YOUR MATERIALS. *Chem. Eng.*, **60**, 202-08 (1953) August.

A guide for the selection of construction materials for chemical plants, where corrosion is a problem, is presented. Several examples are given describing laboratory corrosion, experiments and the conclusions that can be drawn from the tests. E. J. Pyrcioch

Plastic Mains

NATION'S FIRST PLASTIC MAINS LAID AT CATALINA ISLAND. *Gas*, **29**, 32-35 (1953) July.

Three-inch plastic pipe was inserted through the existing badly corroded four-inch mains, and plastic services were inserted in the steel services. The many unforeseen difficulties involved in the initial installation have resulted in the development of a standard replacement procedure to be used with the plastic pipe.

B. E. Eakin

Structural Plastics

Huscher, J. L. ALL-PLASTIC MATERIALS OF CONSTRUCTION FOR CORROSIVE ENVIRONMENTS. *Corrosion*, **9**, 272-276 (1953) August.

A new group of "construction" materials — materials which can be used to fabricate processing equipment and unsupported pipe are now available to the corrosion engineer. These materials — plastics — are sometimes unknown to the corrosion engineer. The concept of plastics as self-supporting structural material for anticorrosive applications requires familiarity with them technically and economically. While hardly a plant in the chemical and allied field does not use plastics as coatings, adhesives, linings, gaskets, etc., the use of corrosion-resistant all-plastic piping and tubing and of all-plastic chemical processing equipment is a recent development which is finding rapid acceptance. The technological and economical aspects of this group of "construction" materials are discussed. Through discriminate and proper applications — some of which are shown in illustrations — plastics are becoming extremely valuable tools in the constant fight against corrosion.

Author's Abstract

Tank Protection

Ewing, S. P. and Hutchison, J. S. CATHODIC PROTECTION APPLIED TO TANK BOTTOMS. *Corrosion*, **9**, 221-231 (1953) July.

A preliminary report on laboratory studies by which a method was devised for determining cathodic current requirements for the protection of storage tank bottoms. Initial field tests of the method, made on three storage tanks near Houston, Texas, showed some inconsistency between test data and calculated values, due to warping of the tank bottoms when empty. The investigation did point out the inadequacy of current potential curves in determining current values for protection. B. E. Eakin

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LP-Gas

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National Fire Protection Association Quarterly
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Official Gazette of the U.S. Patent Office
Oil and Gas Journal
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THE GAS INDUSTRY'S OWN EDUCATIONAL AND RESEARCH FACILITY